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(56) Documents cited  
GB 2050270 A GB 1530135 A US 4871042 A  
NEW SCIENTIST, 30 SEPT. 1989, p.22 "solar cycle  
swings into gear"

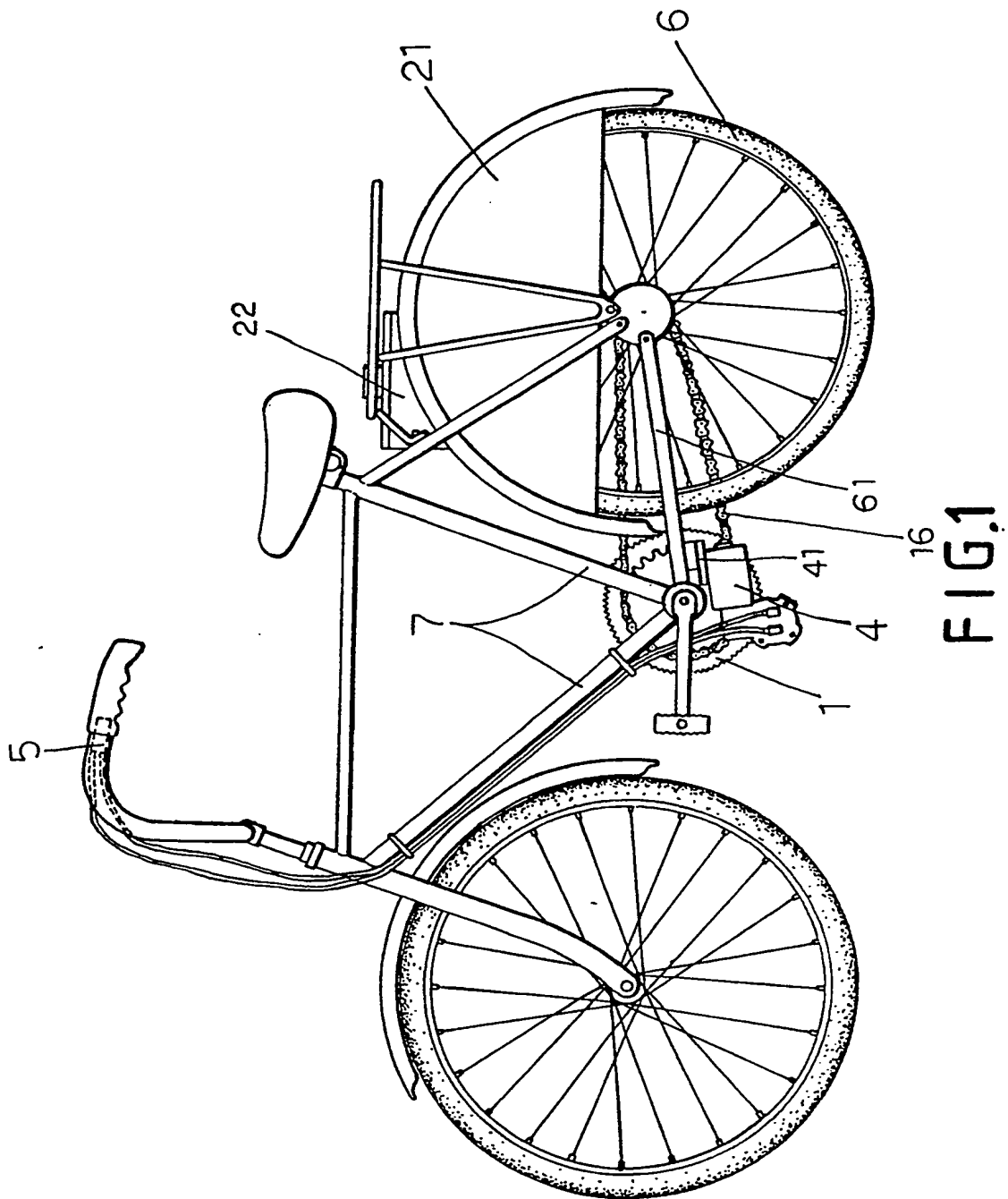
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(57) The bicycle has an electric motor (14) mounted beneath the chainstay (61) and driving, via worm gearing, a gear wheel (11) which is attached coaxially to the chain ring (12). The power source for the motor (14) consists of a solar energy plate (21) and a battery (22) mounted on opposite sides of the rear wheel (6). A speed controller (5) comprising a variable resistor is mounted on the handlebar.

The bicycle enables pedal and/or motor propulsion with speed control of the motor and provides solar recharging of the battery. The weight of the motor and power source is not large; about 2.5 kg.



מחזור



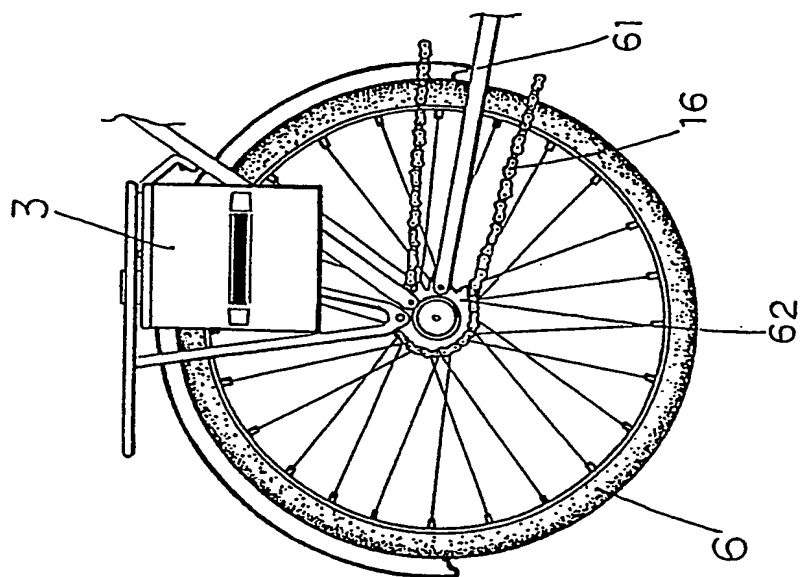
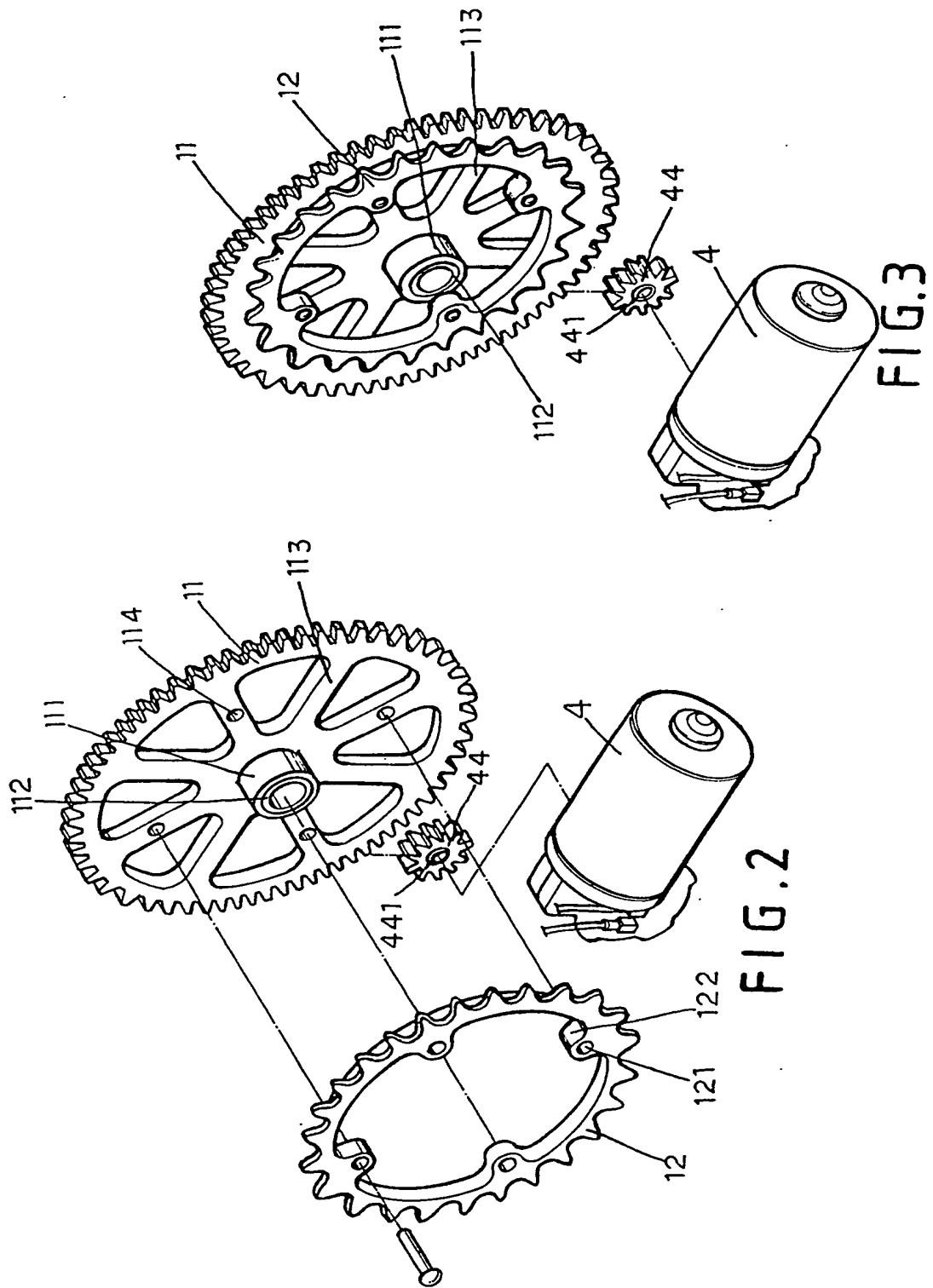
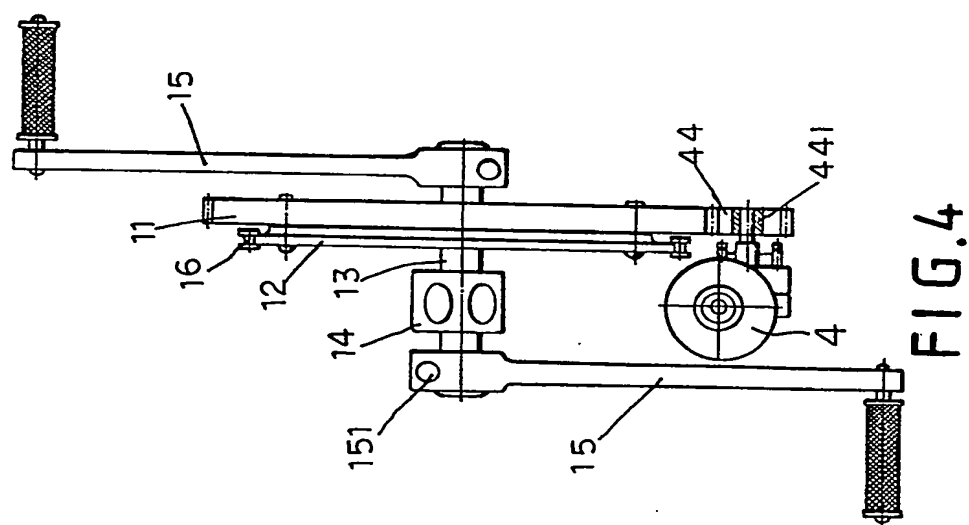
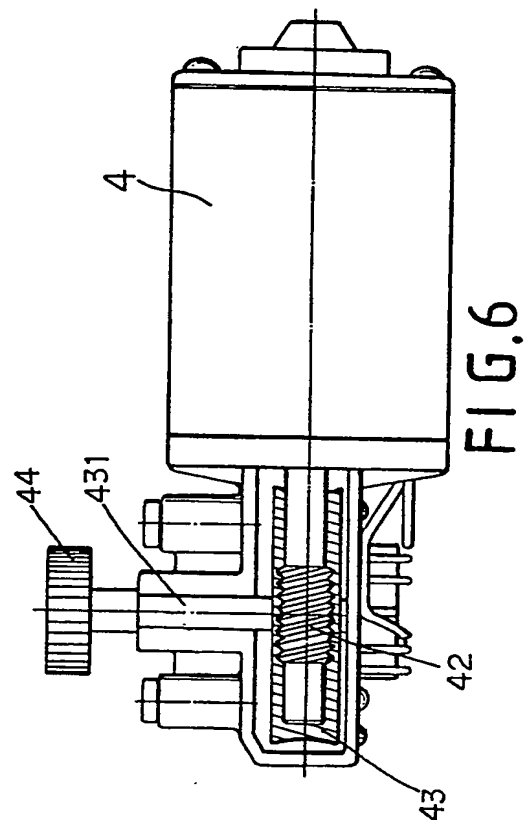
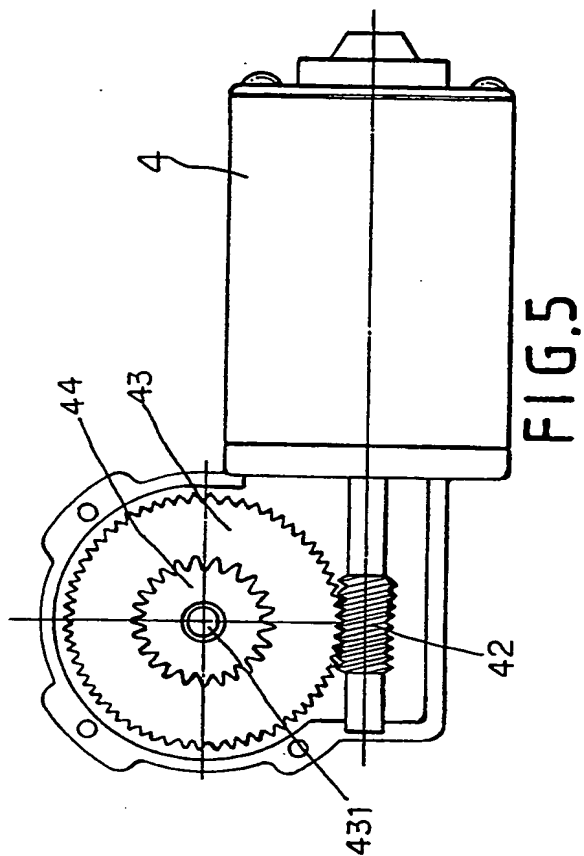


FIG1-A





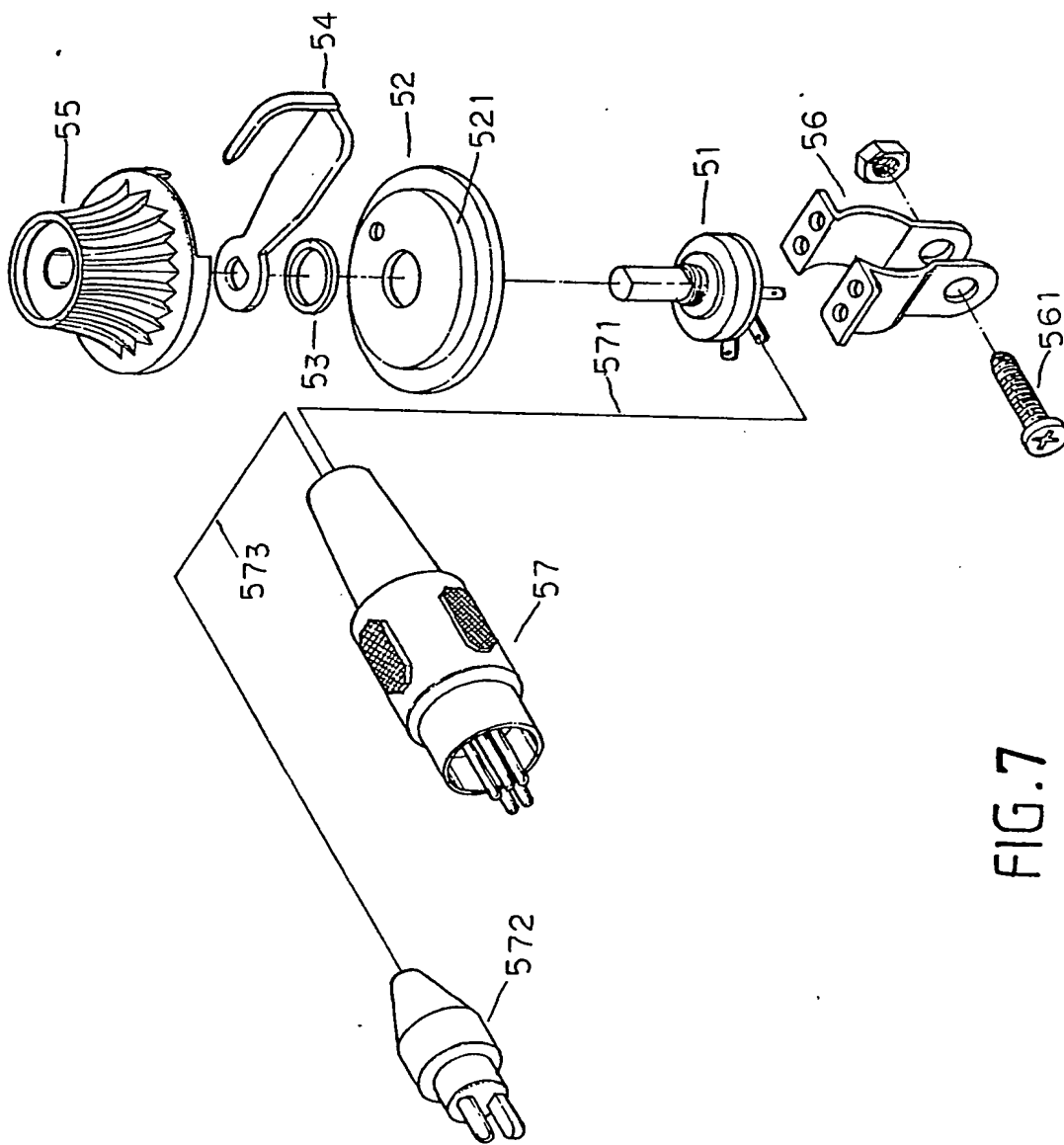


FIG. 7

## MOTOR BICYCLE

## BACKGROUND OF THE INVENTION

As a conventional motor bicycle has only one kind of speed, it is quite inconvenient to use.

5        This invention has an object to supply a motor bicycle which can run at a variety of speed with a motor and also by pedaling.

## SUMMARY OF THE INVENTION

10        The motor bicycle in the present invention has almost the same structure as a conventional bicycle but additionally is provided with a motor, an electric power source, and the chain ring unit differently designed from a conventional one so as to assemble with the motor so that the rotation of the motor can  
15        be transmitted to the rear wheel.

The motor bicycle in the present invention comprises a chain ring unit, an electric power source, a motor and a speed controller.

20        The chain ring unit consists of a large gear wheel and a chain ring riveted together laterally, and assembled with the crank axle so that the gear wheel can rotate together with the crank axle, and the chain ring riveted with the gear wheel rotates to pull the chain to rotate a small chain ring on the shaft of the  
25        rear wheel to rotate the rear wheel.

The electric power source for driving the motor comprises a solar energy plate, a solar energy

converter and a battery so that sun light can be changed into electricity to be stored in the battery and then be supplied to the motor. The battery can also be charged by commercial A.C. current.

5       The motor is hung firmly under the chain stay and has a worm fixed on its shaft and a worm wheel is set to engage with the worm and the shaft of the worm wheel has its end fixed with a small gear to engage with the large gear wheel in the chain ring such that  
10       the rotation of the motor can be transmitted to the large gear wheel, reduced in the speed but augmented in its torque to suit the speed of a bicycle.

      The speed controller is to be fixed on a handlebar to manually control the speed of the motor  
15       to adjust the speed of the bicycle, mainly consisting of a variable resistor and a control arm to change the value of the resistance of the variable resistor in many steps and thus change the speed of the motor in many ways.

## 20       BRIEF DESCRIPTION OF THE DRAWINGS

      Figure 1 is a perspective view of the motor bicycle in the present invention.

      Figure 1-A is a positional view of the battery in the motor in the motor bicycle in the present  
25       invention.

      Figure 2 is an exploded perspective view of the gear wheels in the motor bicycle in the present



invention.

Figure 3 is a perspective view of the gear mechanism combined together in the motor bicycle in the present invention.

5        Figure 4 is a front view of the chain ring unit combined with the crank axle in the motor bicycle in the present invention.

Figure 5 is a front view of the motor in the motor bicycle in the present invention.

10       Figure 6 is an upside view of the motor in the motor bicycle in the present invention.

Figure 7 is an exploded perspective view of the speed controller in the present invention.

#### DETAILED DESCRIPTION OF THE INVENTION

15       The motor bicycle in the present invention as shown in Figures 1, 1-A, and 2, comprises the same structure as a conventional one except a chain ring unit 1, an electric power source 2, a motor 4, and a speed controller 5.

20       The chain ring unit 1 as shown in Figures 2, 3 consists of a large gear wheel 11 and a chain ring 12. The gear wheel 11 has a central cylindrical projection 111 for fixing a one-way bearing 112 to combine with a crank axle 13 so that the gear wheel 11 and the crank  
25       axle 13 can rotate together, a plurality of reinforcing ribs 13 connecting the central section

with the outer circumferential section, and a plurality of holes 114 properly spaced apart in the reinforcing ribs 113 for rivets to pass through for riveting the gear wheel 11 with the chain ring 12. The  
5 chain ring 12 has a large inner opening and a plurality of projecting ears 122 on the inner circumferential edge and a hole 121 in each ear 122 correspondingly facing the holes 114 in the gear wheel 11 and has a smaller-diameter section thicker than the  
10 teeth section so that the teeth of the chain ring 12 can be separated a little from the gear wheel 11 after the both 11, 12 are riveted together laterally.

The electric power source 2 comprises a solar energy plate 21 a solar energy converter and a battery  
15 22 to store the electricity changed from sun light by the solar energy plate 21 and the converter. The battery 22 can also be charged with commercial A.C. current. The solar energy plate 21 is hung firmly beside the rear wheel 6 and the battery 22 is also  
20 hung beside the rear wheel 6 but on the opposite side of the solar energy plate 21.

The motor 4 is fixed at the inner side of the chain ring unit 1 with a plate frame 41 hung under a chain stay 61. The motor 4 has a worm 42 on its shaft  
25 and the worm 42 engages with a worm wheel 43 having a shaft 431. The shaft 431 is fixed on with a one-way bearing 441 at its end and fixed around the bearing

441 is a small wheel 44 to engage with the large gear wheel 11 so that the rotation of the motor 4 can be transmitted to the gear wheel 11.

The speed controller 5 is to be combined with a handlebar, comprising a variable resistor 51, a disc 52 formed with an annular flat projection 521, a ring 53, a control arm 54 and a cap 55 combined together and then fixed on the handlebar with a couple of clasping plates 56 pinching the speed controller 5 with a bolt and nut 561. A wire 571 is connected between the middle pin of the variable resistor 51 and one pole of the electric power via a plug 57.

As shown in Figure 4, in assembling, the chain ring unit 1 is to be passed through by the crank axle 13, a tube supporter 14 is to be fixed on the crank axle 13 near the left crank arm 15 for supporting the ends of the down tube 7 and the seat tube 7, the motor 4 is to be fixed under the chain stay in such a way that the gear 44 may engage with the gear wheel 11, and then two crank arms 15 are to be fixed on both ends of the crank axle 13 with pins 151.

In operating this motor bicycle, the control arm 54 of the speed controller 5 is to be manually moved to rotate for a certain angle and then the variable resistor 51 can also be rotated to change the value of its resistance, which then controls or limits the

amount of current flowing to the motor 4 via the wire 571. The motor 4 can rotate in many different speed depending on the value of resistance of the variable resistor 51, then the rotation of the motor 4 can be  
5 reduced through the worm 42 and the worm wheel 43, augmenting its torque to suit the speed of the bicycle. The gear 44 then rotates the gear wheel 11, which will cause the chain ring 12 to rotate synchronously pulling the chain 16 to move a small  
10 chain ring 62 fixed on the shaft of the rear wheel 6. Therefore, this motor bicycle is to be moved forward.

In general, this motor bicycle is considered to have the following features.

1. It can be moved electrically or by pedaling,  
15 or by both at the same time, to reach the speed of 25 kilo/hour.

2. It can utilize solar energy to charge the battery for 6 hours to run 2 hours or to charge it with A C 110 V current for 6 hours to run 2-3 hours.

20 3. The speed of the motor is reduced to augment its torque to suit the speed of a bicycle.

4. The speed controller can control the speed of the motor and consequently the speed of the bicylce.

25 5. The weight of the motor together with the electric power source is about 2.5 kilograms, not a large load to the bicycle.

6. It can never pollute air.

WHAT IS CLAIMED IS

1. A motor bicycle comprising :  
a chain ring unit consisting of (1) a large gear wheel  
having a central cylindrical projection for fixing a  
5 one-way bearing to support a crank axle therein, a  
plurality of reinforcing ribs connecting the central  
section with the outer circumferential section and a  
plurality of holes properly spaced apart in the  
reinforcing ribs for riveting the gear wheel with a  
10 chain ring, and (2) a chain ring having a smaller size  
than the large gear wheel and a plurality of projecting  
holed ears at the inner circumferential edge, said  
chain ring having a thicker diameter section to  
separate its circumferential teeth a little from the  
15 gear wheel when the both are laterally riveted  
together;  
an electric power source having a solar energy plate, a  
solar energy converter and a battery mounted on both  
sides of the rear wheel for changing sun light into  
20 electric energy to be stored in the battery and to be  
supplied to a motor;  
a motor hung firmly under the chain stay and having a  
worm fixed on its shaft to engage with a worm wheel  
having its shaft end fixed with a one-way bearing  
25 fitted around with a small gear engaging with the large  
gear wheel in the chain ring unit;

a speed controller consisting of a variable resistor, a disc, a ring, a control arm and a cap assembled together on a handlebar and electrically connected with the power source and an electric plug; and

5 said control arm in the speed controller possible to be manually and adjustably rotated to cause the variable resistor to rotate synchronously to change its value of resistance in many stages and thus to alter the current to the motor from the power source so that the  
10 rotation of the motor can be altered accordingly and its rotating speed can be reduced by the combination of the worm, the worm wheel, the small gear and the large gear wheel, augmenting its torque to suit the speed of a bicycle.

15 2. The motor bicycle as claimed in Claim 1, wherein the electric power source comprises a solar energy plate, a solar energy converter and a battery to be charged either by solar energy or commercial A.C. current.

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Patents Act 1977  
Examiner's report to the Comptroller under  
section 17 (The Search Report)

Application number

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Relevant Technical fields

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(ii) Int Cl (Edition 5 ) B60K 1/00, 1/02;  
B62K 11/00; B62M 23/02

Databases (see over)

(i) UK Patent Office

(ii)

ONLINE DATABASE : WPI

Search Examiner

J TWIN

Date of Search

5 February 19

Documents considered relevant following a search in respect of claims

1

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	GB 2050270 A (BARI)	1
A	GB 1530135 (LUCAS)	1
A	US 4871042 (HSU)	1
A	NEW SCIENTIST, 30 SEPT 1989, page 22: "Solar cycle swings into gear"	1

SF2(p)

HD2ABK

Category	Identity of document and relevant passages	Relevant to claim(s)

#### Categories of documents

X: Document indicating lack of novelty or of inventive step.

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P: Document published on or after the declared priority date but before the filing date of the present application.

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